

Objective

Study feasibility of actively controlling spacecraft potential by charged particle emission

Approach

Conduct experiments using:

- ATS-5 electron emitter
- ATS-6 plasma emitter
- UCSD particle instruments

Analyze particle data to obtain:

- Spacecraft potentials with and without particle emission in various environments
- Differences in the effectiveness of electron and plasma emission

Figure 2. Objective of investigation

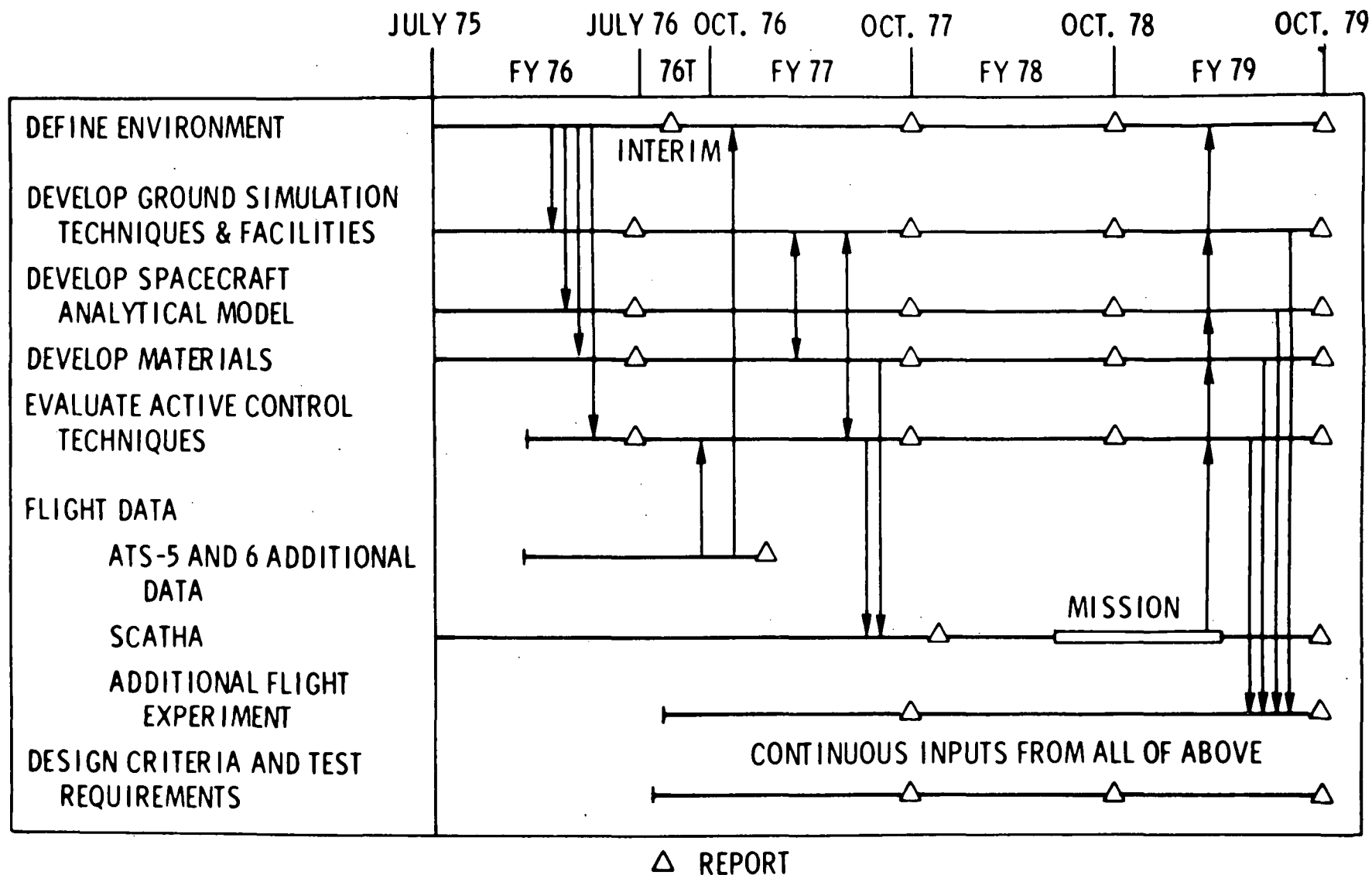


Figure 1. Schedule for Spacecraft Charging Investigation

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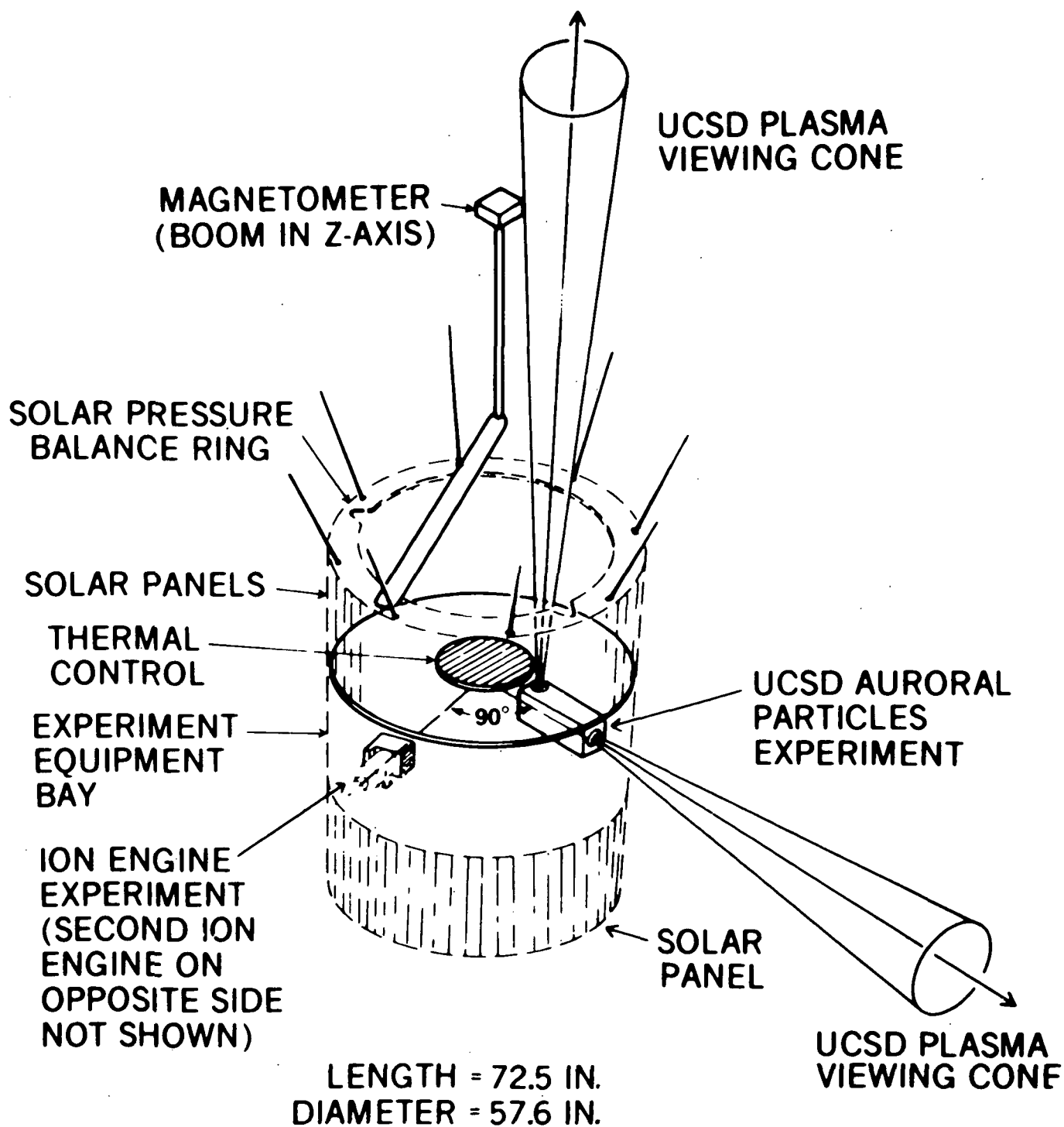
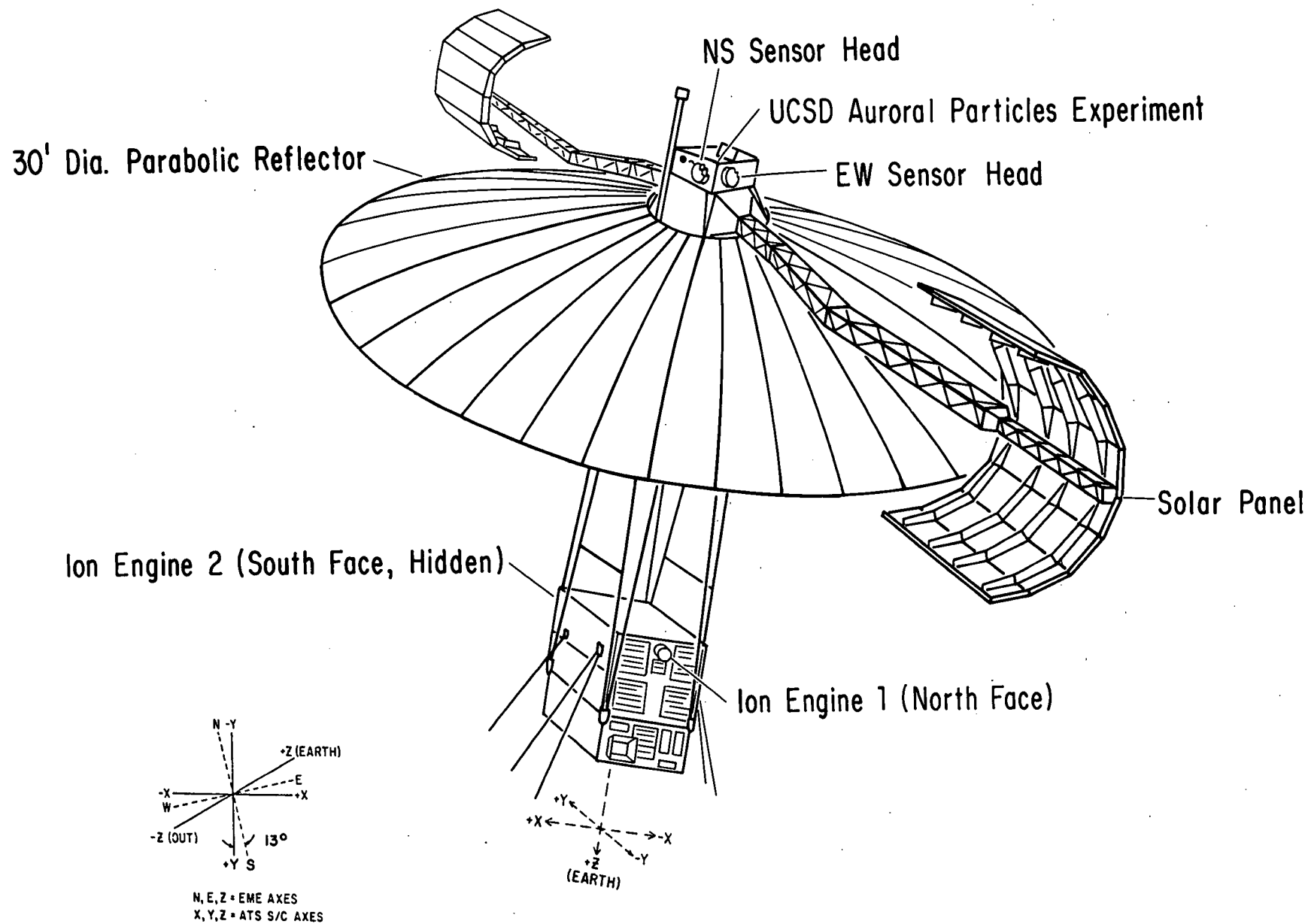


Figure 3. ATS-5: Detectors and Ion Engines



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Figure 4. ATS-6: Detectors and Ion Engines

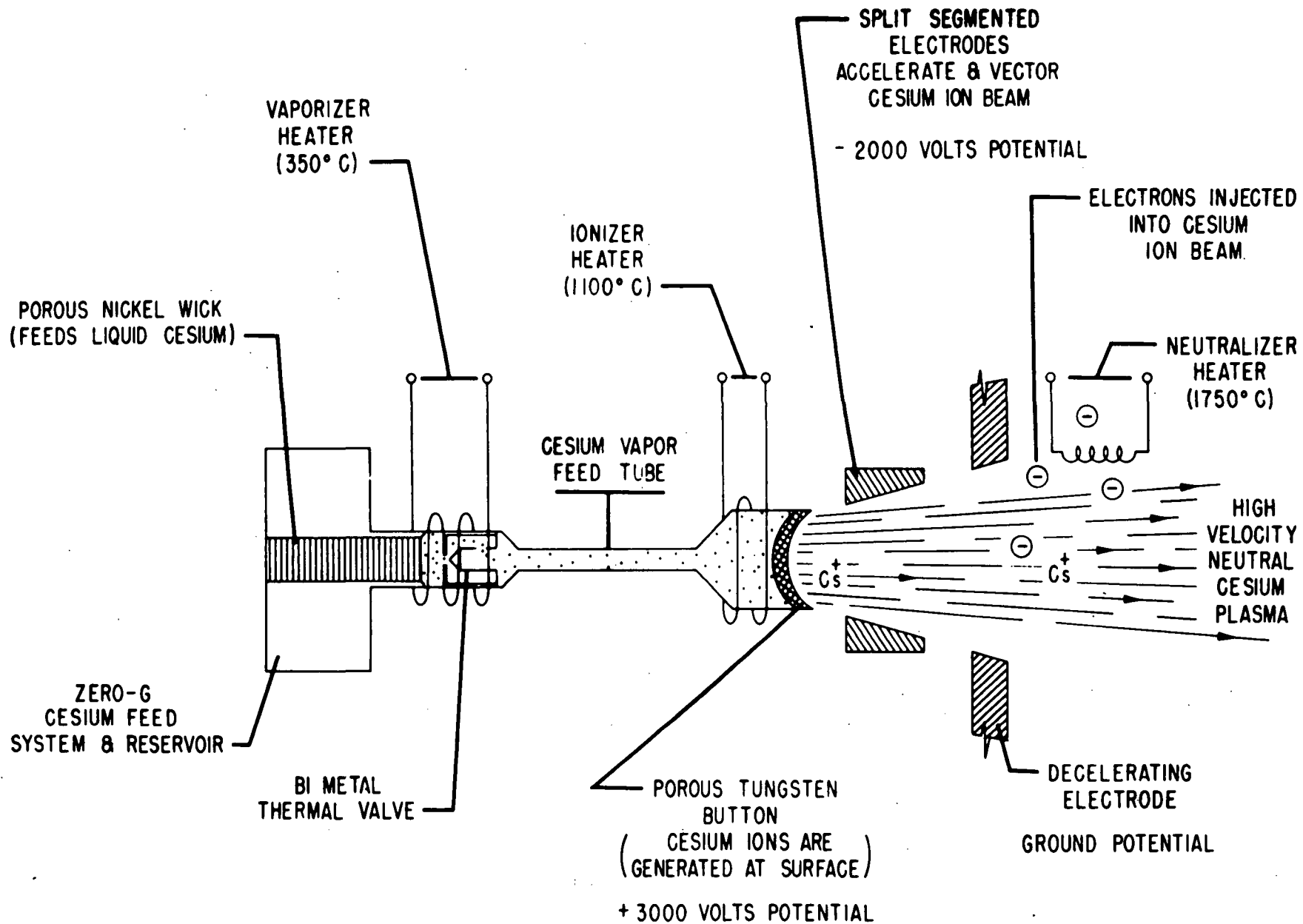
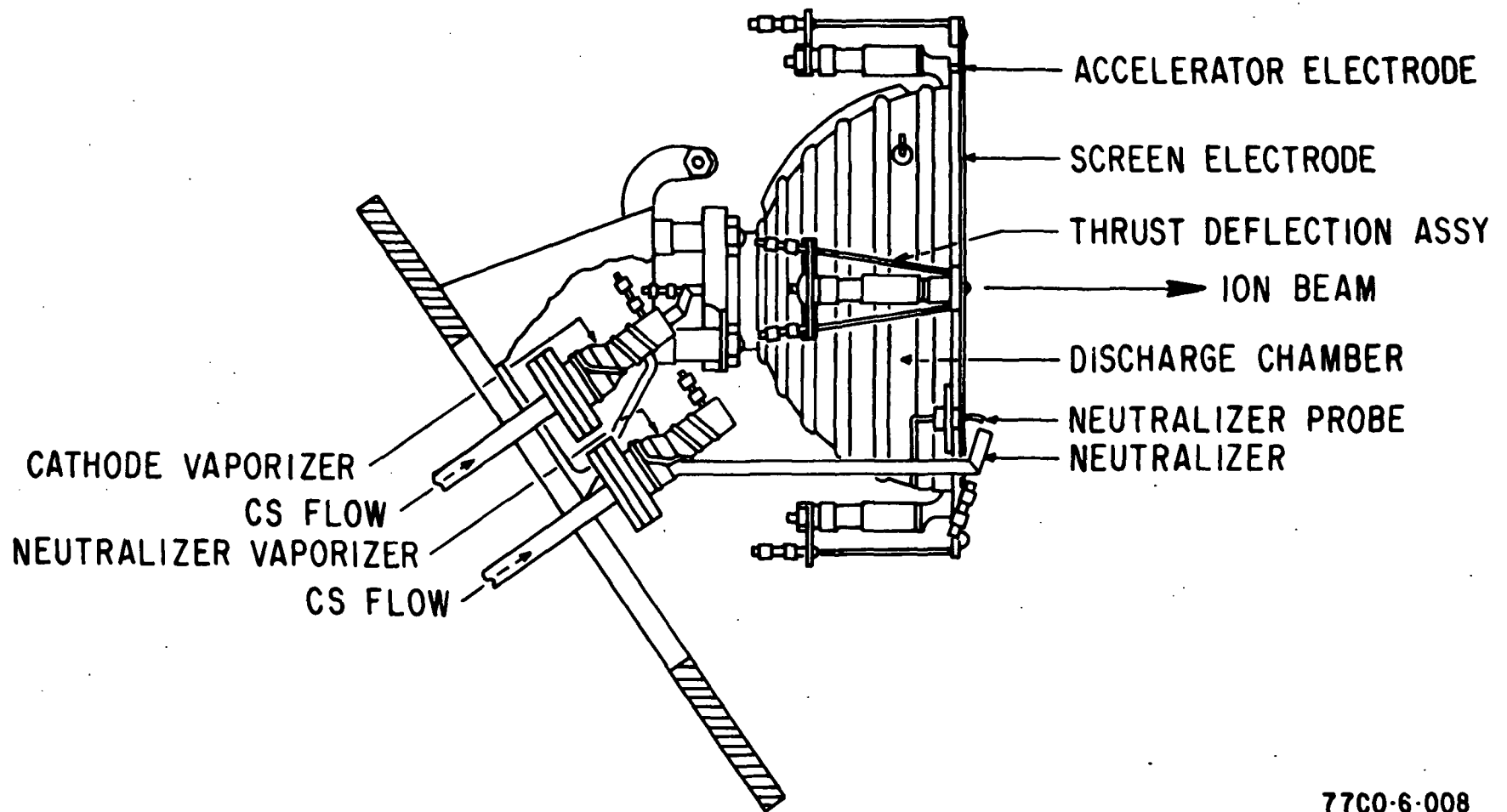


Figure 5. ATS-5: Thruster

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FIGURE 6. ATS-6: THRUSTER

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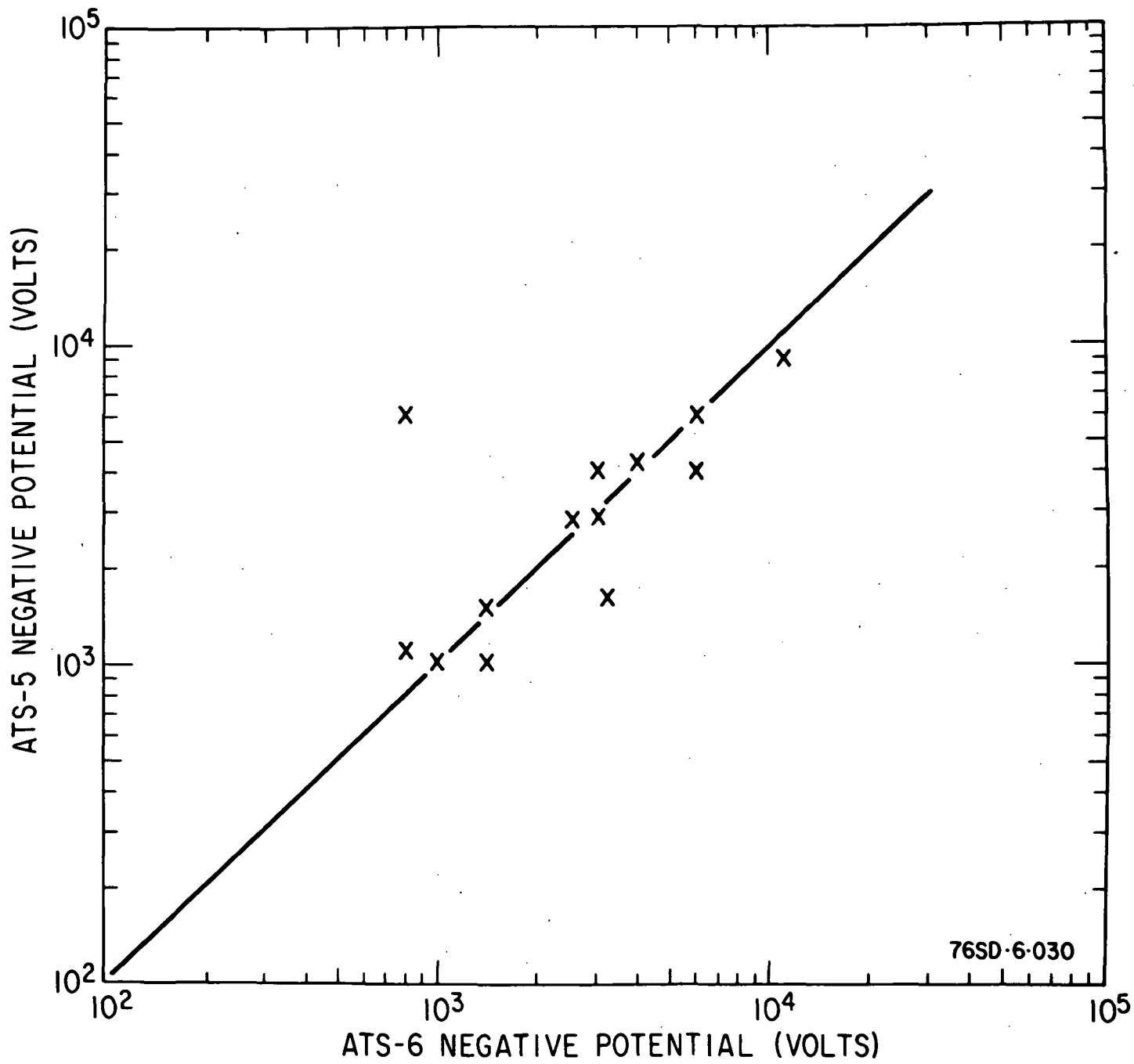


Figure 7. ATS-5 and ATS-6: Comparison of Passive Spacecraft Potentials

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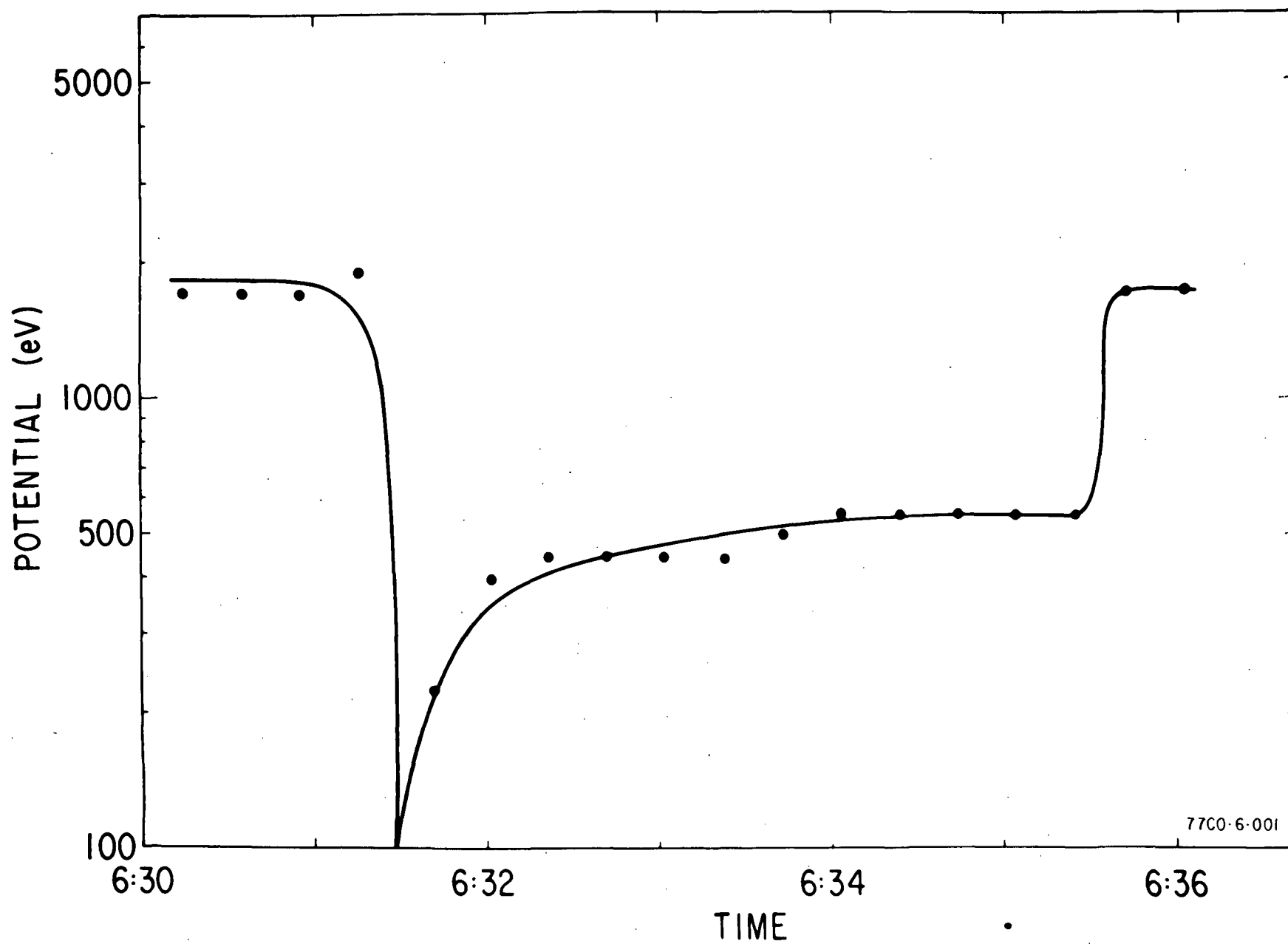


Figure 8. ATS-5: Potential During Eclipse/Neutralizer Operation 9/20/74

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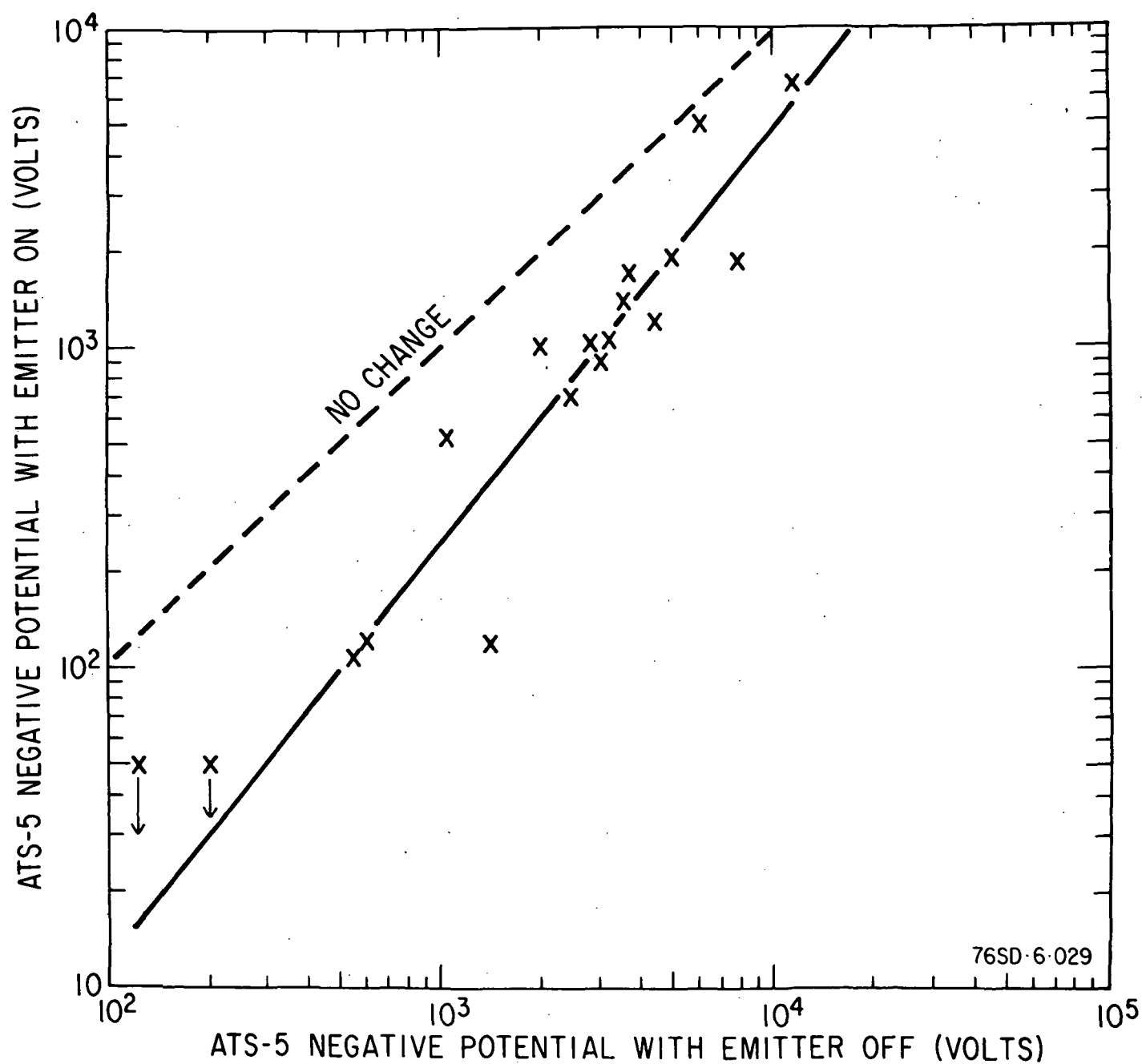
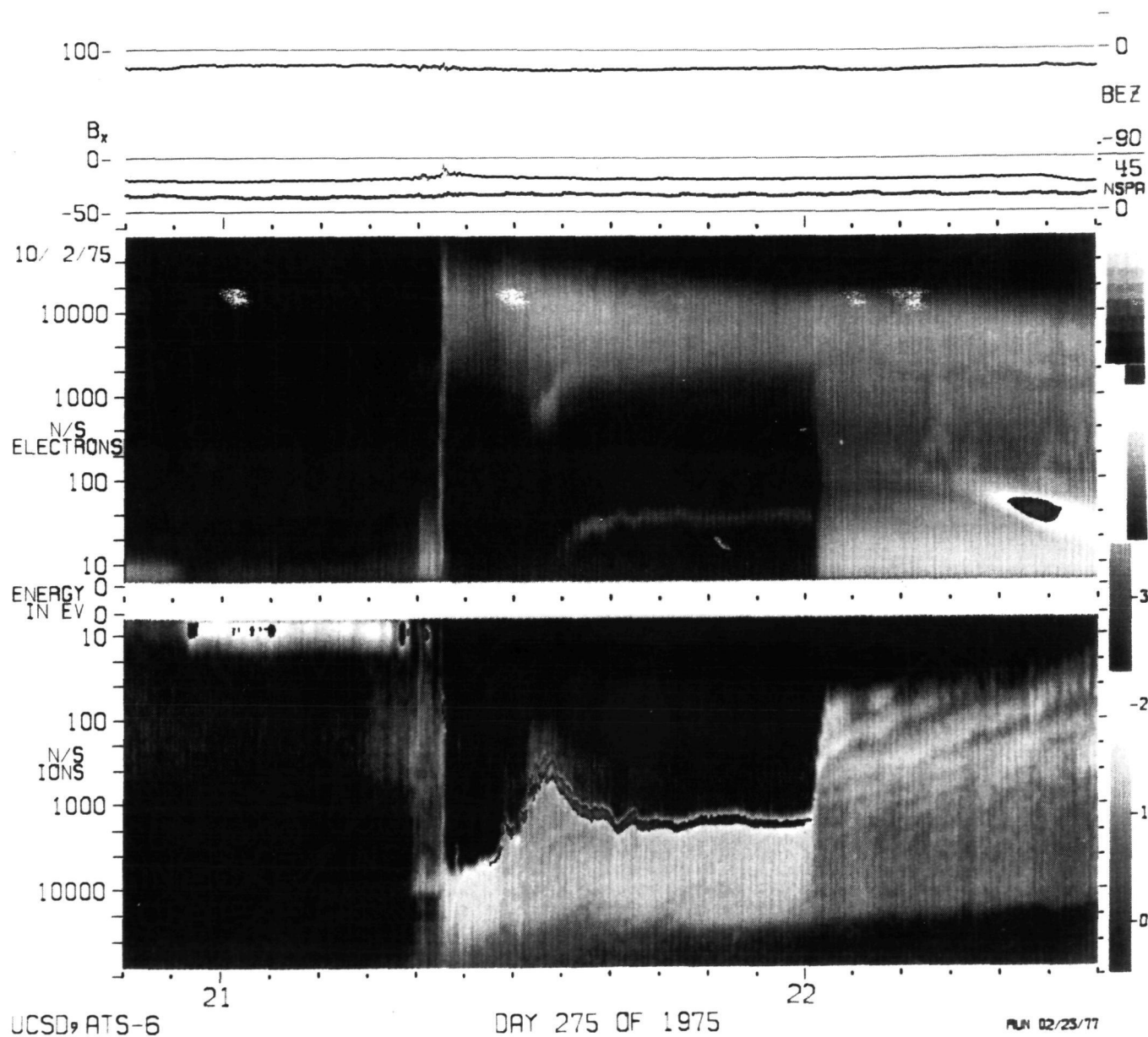


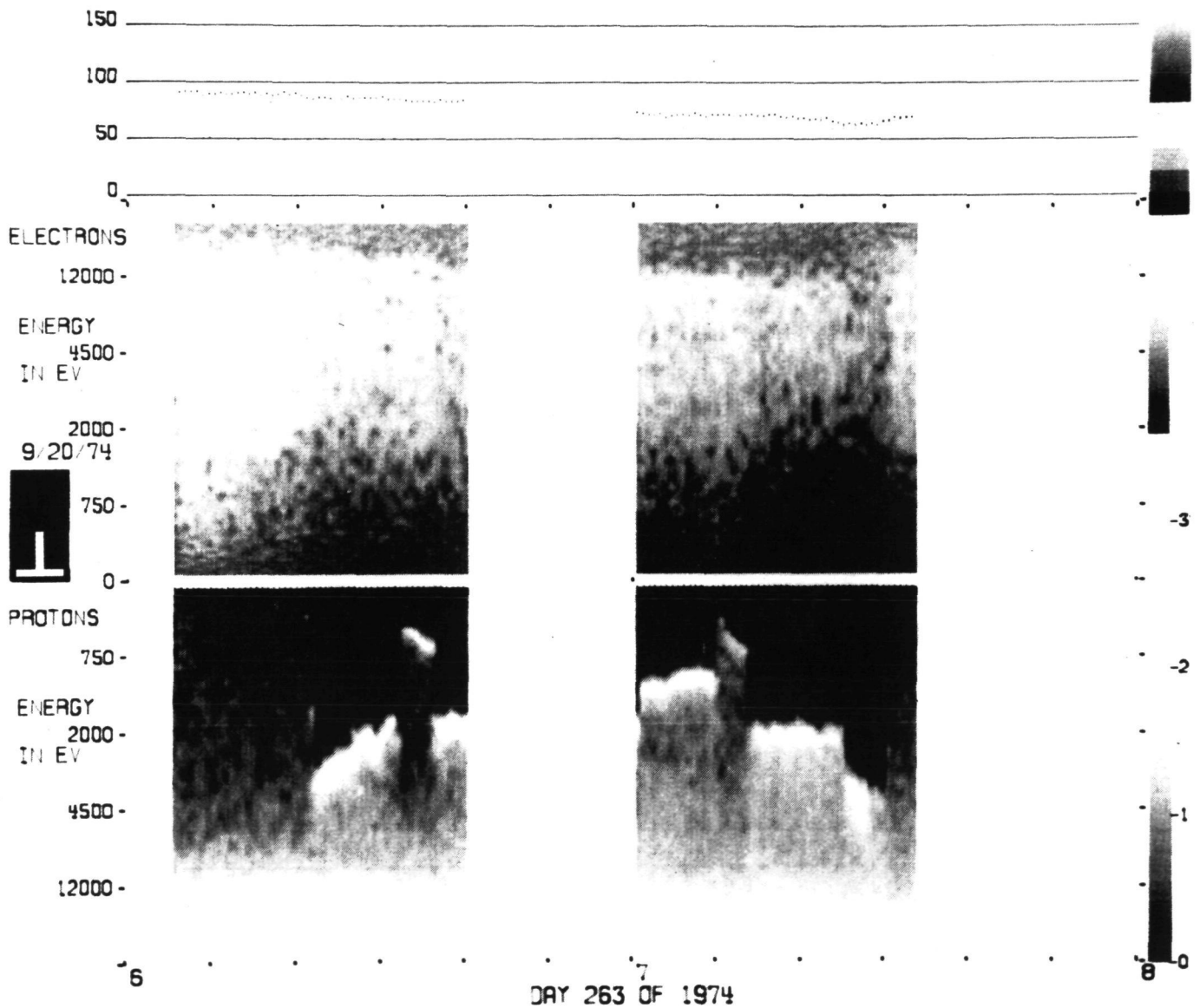
Figure 9. ATS-5: Effect of Electron Emitter on Spacecraft Potentials

200 DBE=2.3 DBP=1.4 DBS= .070 SIPE= 3 PSN= 2 NS= 1.0 PA(-360, 360) COM= 24764715 SA= -6 LNG= 35 90



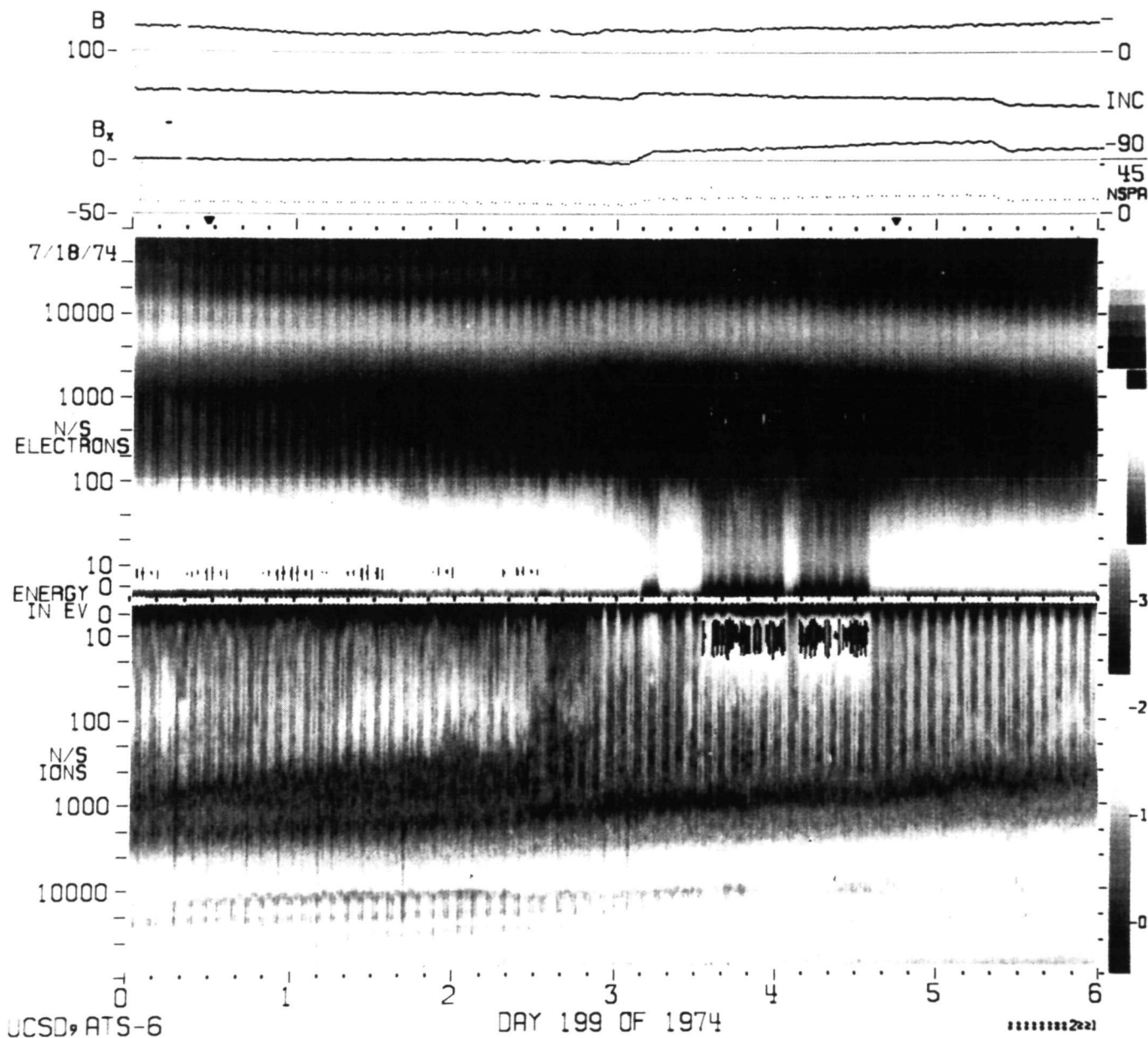
Spectrogram 1. ATS-6: Eclipse with Injection of Hot Plasma; 10/2/75

MASTER 1 MATE 2 TA= .7 TS= .7 TM= .7 COMMAND 0000100 ST=.070 EL= .3 PA= .3 PSNG= 1



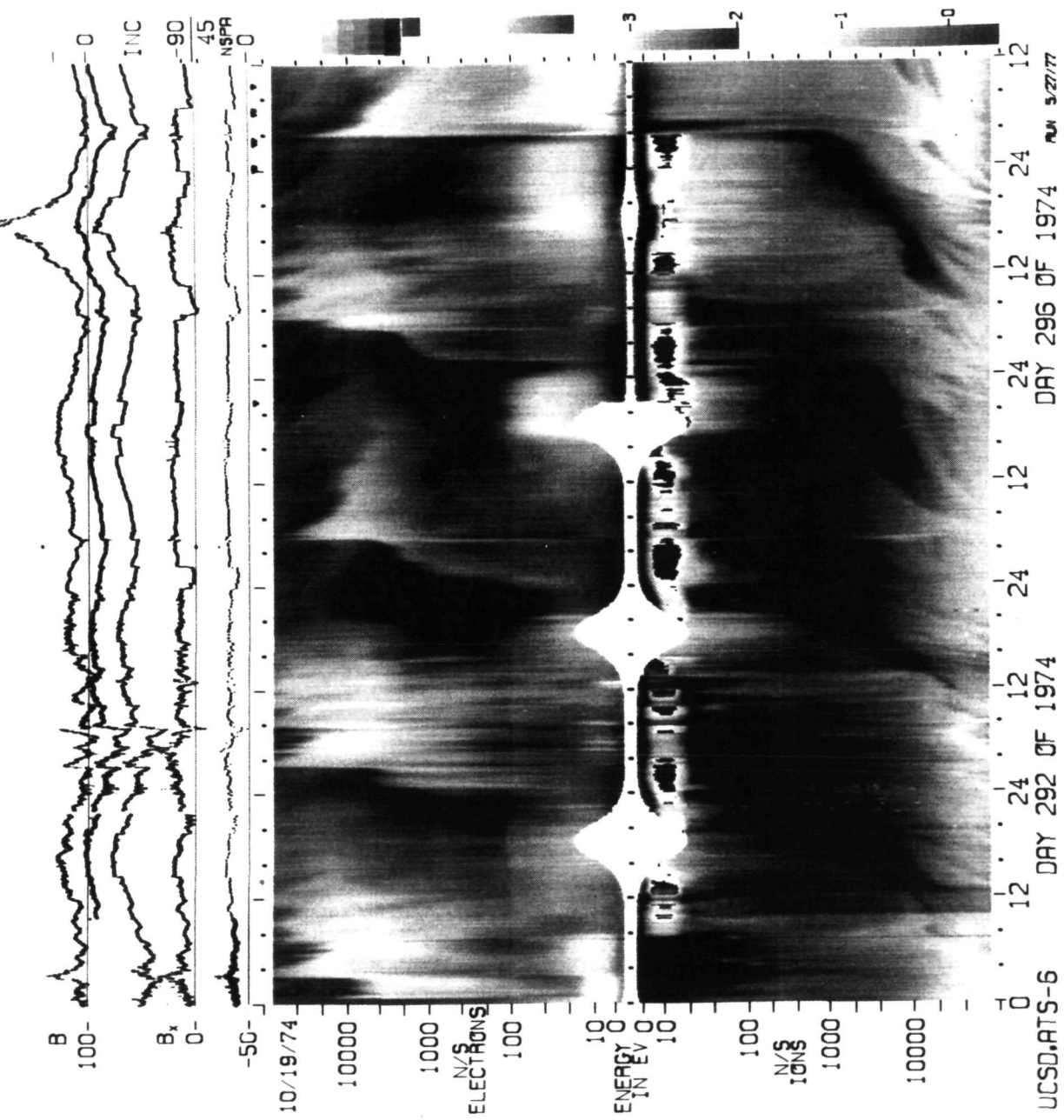
Spectrogram 2. ATS-5: Neutralized Operation in Eclipse; 9/20/74

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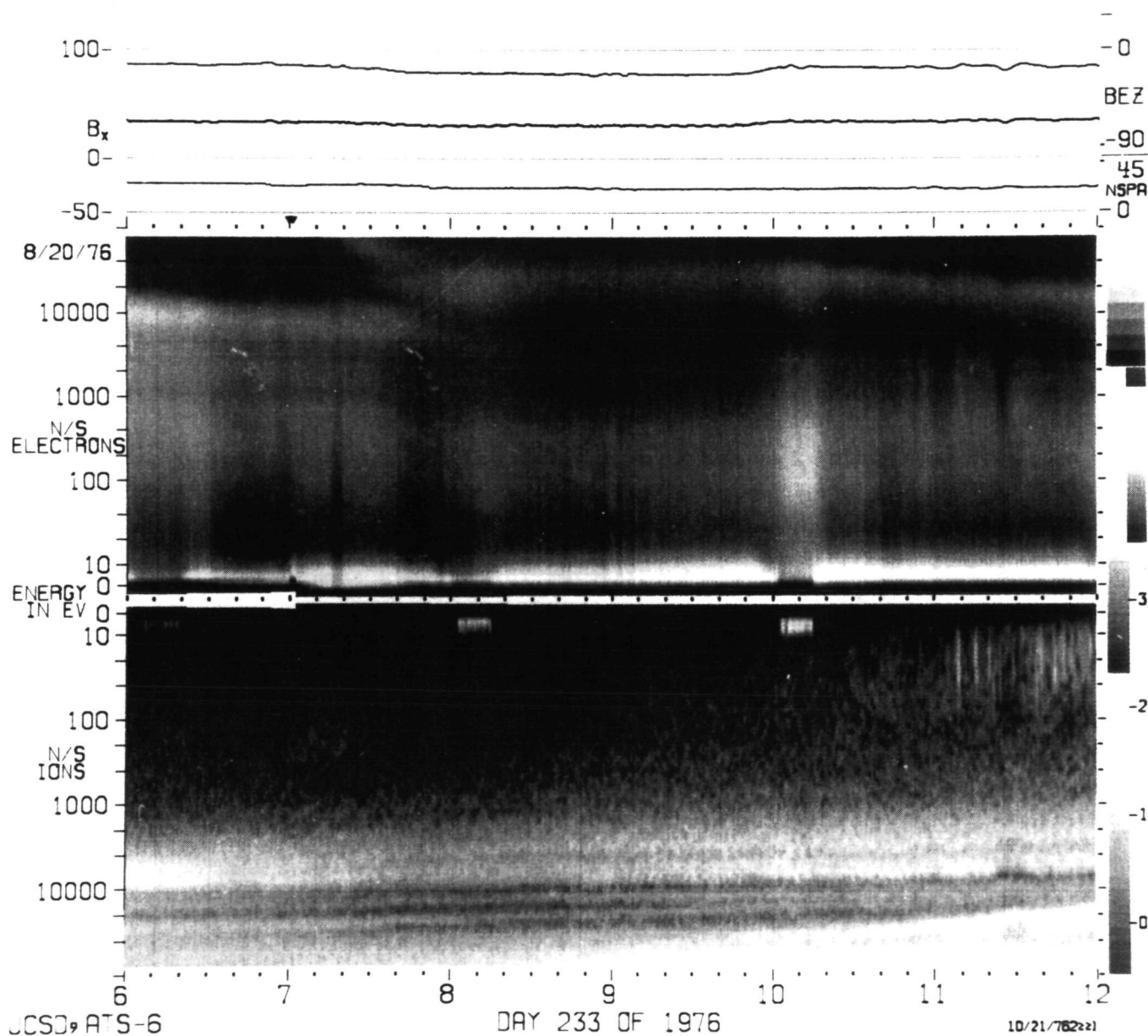
Spectrogram 3. ATS-6: Ion Engine Operation; 7/18/74

200-DBE=2.3 DBP=1.4 DBS=0.060 SIPE= 3 PSN= 2 NS=15.0 PRI=360.360 COM= 120371410 SA= -20 LUG=265 90



Spectrogram 4. ATS-6: Ion Engine Operation; 100 Hours; 10/19/74

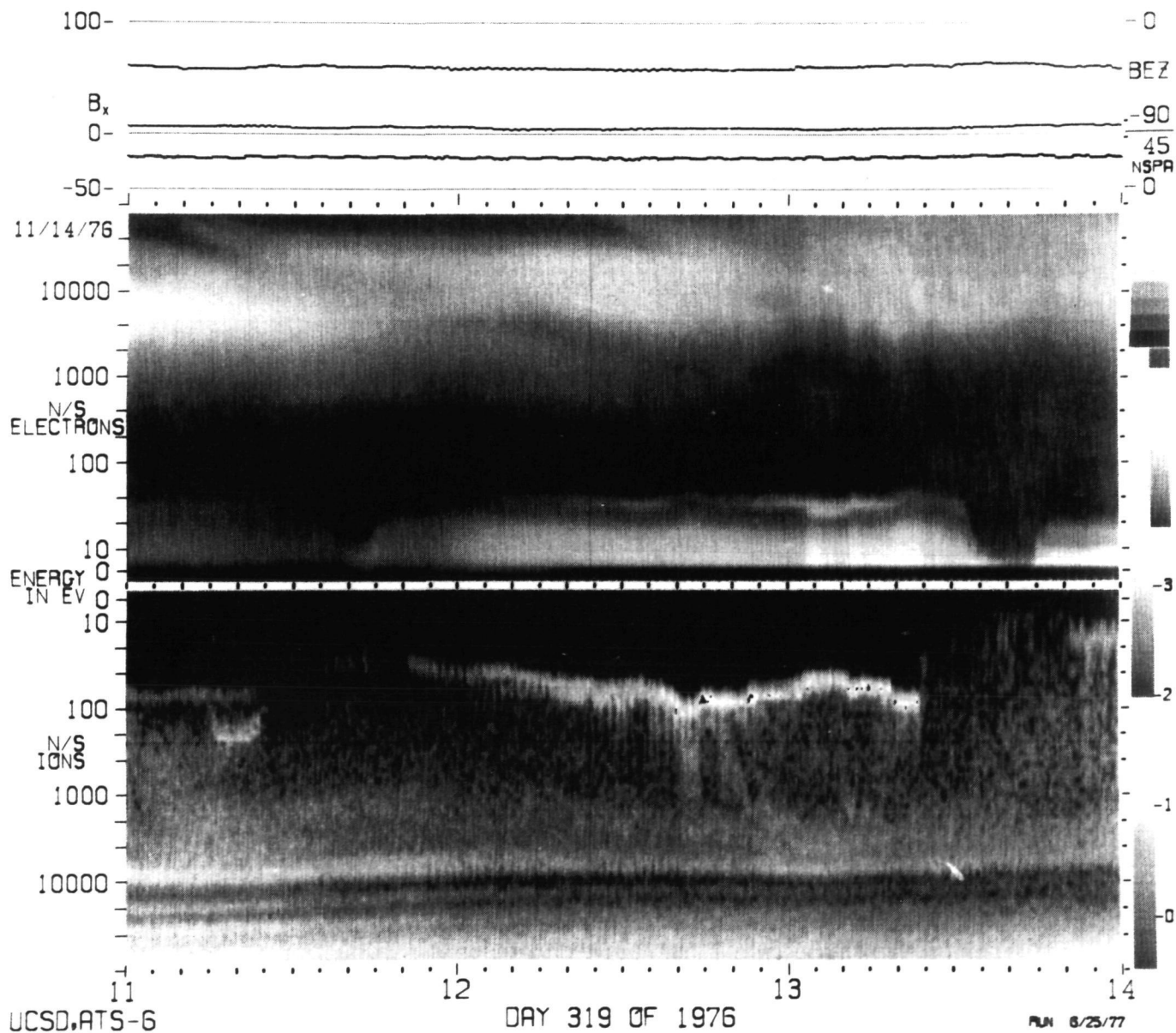
200 DBE=2.3 DBP=1.4 DBS= .070 SIPE= 3 PSN= 2 NS= 1.0 PA(-360, 360) COM= 620773116 SA= -6 LNG= 11 90



Spectrogram 5. ATS-6: Neutralizer Operation in Daylight; 8/20/76

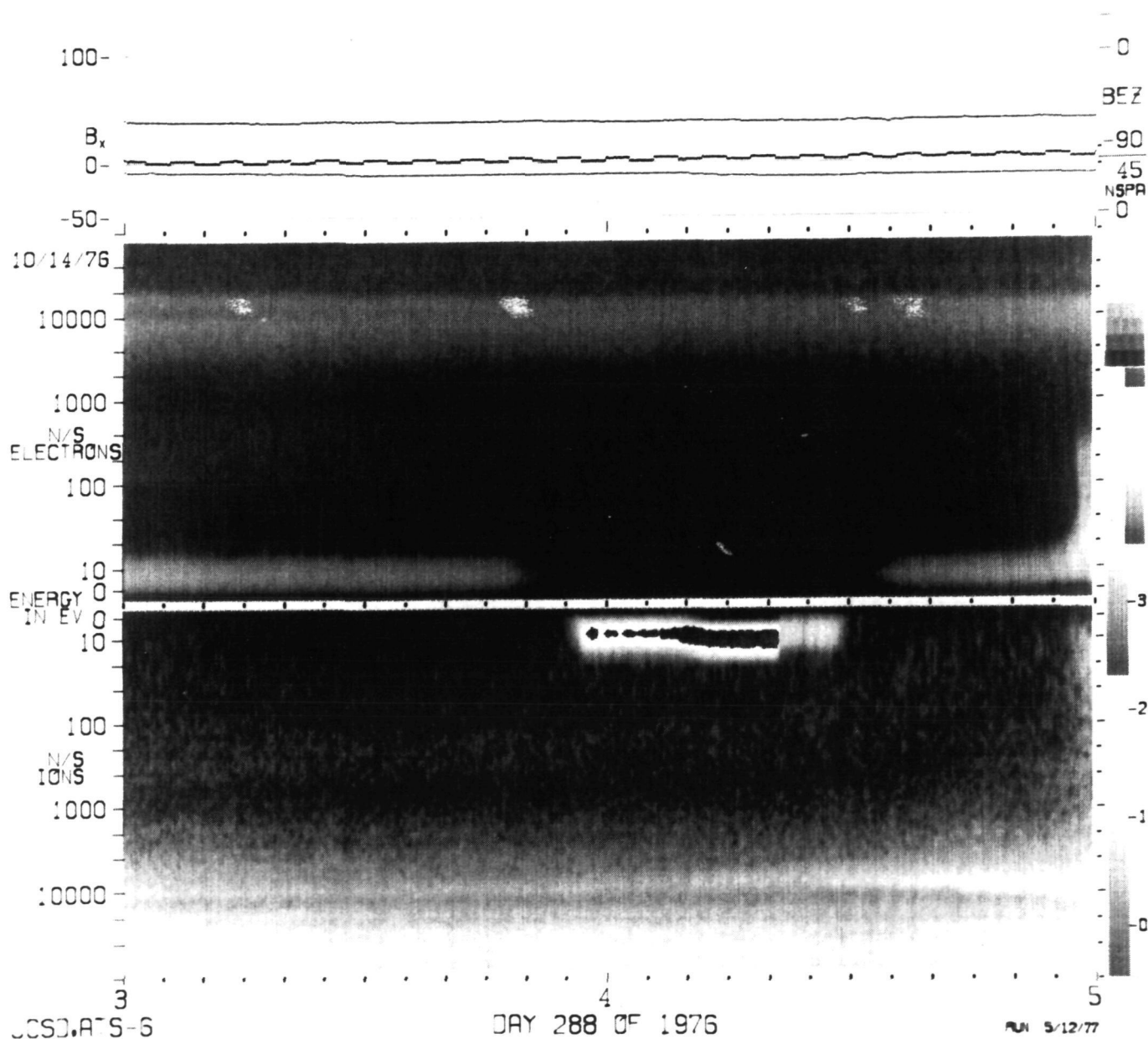
200-DBE=2.0 DBP=1.2 DBS=0.060 SIPE= 3 PSN= 2 NS= 1.0 PRA(-360,360) COM= 20573414 SA= -6 LNG=244

90



Spectrogram 6. ATS-6: Neutralizer Operation in Daylight; 11/14/76

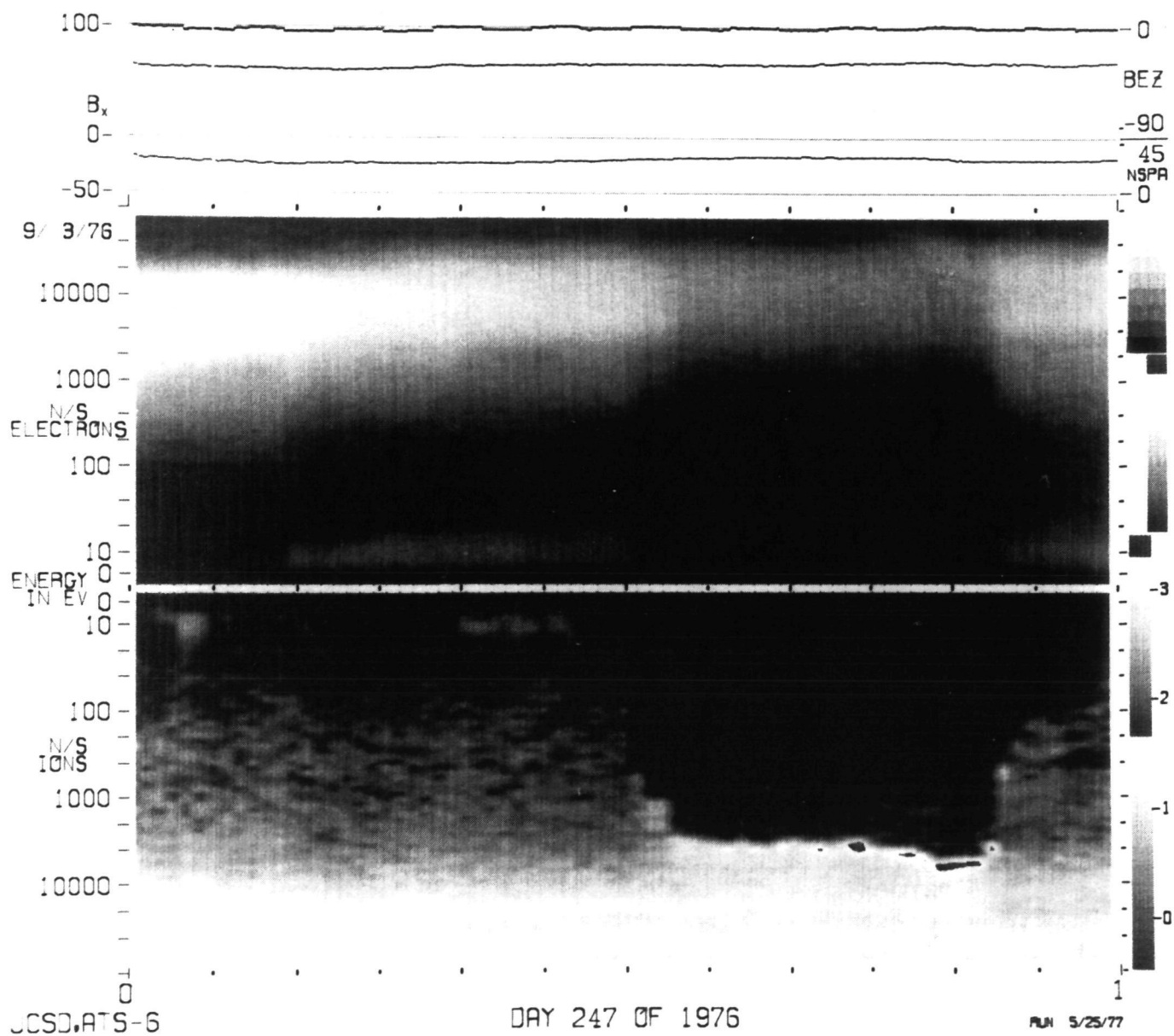
200-DBE=1.8 DBP=1.4 DBS=0.070 SIPE= 3 PSN= 2 NS= 1.0 PAI(-360, 360) COM= 20572404 SA= -6 LMG=291 . . 90



Spectrogram 7. ATS-6: Neutralizer Operation in Eclipse; 10/14/76

200-DBE=2.3 DBP=1.4 DBS=0.050 SIPE= 3 PSN= 2 NS= 1.0 PAI=-360.360 COM= 20365506 SA= -6 LNG=350

90



Spectrogram 8. ATS-6: Neutralizer Operation in Eclipse; 9/3/76